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AUTHOR Balschweid, Mark A.; Thompson, Greg W.; Cole, R. L.
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ABSTRACT

A study determined if 52 responding participants (of 81) in the Summer Agriculture Institute (SAI) used the agricultural information in their curricula. The Department of Agriculture Education and General Agriculture, Oregon State University, and the Oregon Farm Bureau established SAI to give nonagricultural K-12 teachers an overview of agriculture and its impact on society in a week-long, 60-hour course that required completion of a lesson plan that integrated agriculture into a lesson they currently taught. An instrument collected data on teacher perceptions of student interest in learning about agriculture, participants' use of the agricultural literacy materials, and demographic information about respondents. Participants integrated agriculture into their existing lesson plans, with some using the information to a high degree. Teacher perceptions of content, structure, and usability of SAI presentations and materials were positive. Teachers perceived students as being most interested in animals, crops, and food processing. Teachers felt the greatest barriers to implementing agriculture into existing lessons were the time necessary for curricula changes and access to necessary supplies, materials, and information. In general, they perceived SAI to be well planned, appropriate to their level of understanding, and adaptable to the grade level they teach. Research was recommended into teacher motivation for enrolling and identification of materials to provide to teachers. (Contains 17 references.) (YLB)

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THE EFFECTS OF AN AGRICULTURAL LITERACY TREATMENT ON PARTICIPATING K-12 TEACHERS AND THEIR CURRICULA

by

Mark A. Balschweid
Instructor
Agriculture Education and General Agriculture
112 Strand Agriculture Hall
Oregon State University
Corvallis, Oregon 97331-2212
Phone: (541) 737-5658
FAX: (541) 737-2256
e-mail: balschwm@ccmail.orst.edu

Greg W. Thompson
Assistant Professor
Agriculture Education and General Education
112 Strand Agriculture Hall
Oregon State University
Corvallis, Oregon 97331-2212
Phone: (541) 737-1337
FAX: (541) 737-2256
e-mail: thompsgr@ccmail.orst.edu

R. L. Cole
Professor
Agriculture Education and General Education
112 Strand Agriculture Hall
Oregon State University
Corvallis, Oregon 97331-2212
Phone: (541) 737-1336
FAX: (541) 737-2256
e-mail: colel@ccmail.orst.edu

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THE EFFECTS OF AN AGRICULTURAL LITERACY TREATMENT ON PARTICIPATING K-12 TEACHERS AND THEIR CURRICULA

Introduction

As we approach the dawn of the 21st century, it is important to consider the status of our nation's agricultural knowledge. The United States has always relied on it's own agriculture to produce one of the most abundant, least expensive food supplies in the world (Birkenholz & Stewart, 1991). American farmers have become increasingly more efficient in food production practices. As a result, fewer and fewer members of our society have been involved in the production of our food and fiber (Birkenholz, Harris & Pry, 1994). Less than 2% of the population raise crops that feed and clothe the people of the United States and many foreign countries. Due to the success of the American farmer, most citizens are not required to work in production farming (Birkenholz, 1990). As a result, the general public is becoming increasingly unaware of the source and methods used in the production of their food (National Research Council, 1988; Raven, 1994). This problem can be identified as a lack of "agricultural literacy" (Russell, McCracken, & Miller, 1990; Frick, Kahler, & Miller, 1992).

As defined in the National Research Council's report Understanding Agriculture: New Directions for Education (1988), an agriculturally literate person should understand the food and fiber system, which would include its history and its current economic, social, and environmental significance to all Americans. Furthermore, Frick et. al (1992) adds:

> Agriculture literacy is understanding and possessing knowledge of our food and fiber system. An individual possessing such knowledge would be able to synthesize, analyze, and communicate basic information about agriculture. Basic agricultural knowledge includes: production of plant and animal products, the economic impact of agriculture, its societal significance, agriculture's important relationship with natural resources and the environment, the marketing and processing of agricultural products, public agricultural policies, the global significance of agriculture, and the distribution of agricultural products (p. 41).

Although a decreasing number of Americans are directly involved in the production of food, more and more are concerned about what they perceive as unnecessary and inappropriate methods of satisfactory food production (National Agriculture Research and Extension Users Advisory Board, 1991). As general concerns rise over the way our food is produced, public impressions are tainted by the actions of special interest groups (Lichte & Birkenholz, 1993). As a result, many Americans elect and influence lawmakers to directly intervene into the practices used in producing our food and fiber (Hamlin, 1962). Because this nation has progressed to two full generations removed from living and working on farms, lawmakers cannot be expected to make informed decisions regarding the safe and appropriate production of our food supply (Flood & Elliot, 1994; Deavers, 1987; North Carolina State University, 1988; Nipp, 1988).

One factor influencing the decline in agricultural literacy in our nation today is the lack of educational emphasis placed upon this vital component of our society. The National Research Council (1988) stated: "Agriculture is too important a topic to be taught only to the relatively small percentage of students considering careers in agriculture and pursuing vocational agriculture studies" (p. 1). In 1988, The National Research Council recommended that: "Beginning in kindergarten and continuing through twelfth grade, all students should receive some systematic instruction about agriculture" (p. 2). This instruction could be integrated into the existing coursework required during compulsory education.

Birkenholz et. al (1993) concluded that teachers in elementary and secondary schools should be encouraged to develop a greater understanding of the importance and significance of agriculture in this country and the world. "Instructional assistance should be provided through pre-service and inservice programs which would facilitate the use of agricultural examples in elementary and secondary school classes" (p. 57). Furthermore, secondary teachers in history, social science, science, mathematics, language arts, and fine arts teach subjects that could provide a context for infusing instruction about agriculture (Law, 1990).

In addition, in an editorial appearing in The Chronicle of Higher Education, Mawby (1984) described the role of land grant colleges and universities in educating non-farm people about agriculture:

> A variety of institutions can play a role in shaping the direction of American agriculture, but none is more qualified than the land grant colleges of agriculture, with their unique tradition of research, teaching, and extension. Taken collectively, these institutions can educate or influence both the people and the processes affecting the future of agriculture. (p. 72)

With this uniquely important qualification, it seems imperative that program directors' in colleges of agriculture utilize their positions of influence to modify the current practices of educating the people about the future of agriculture. Through implementation of programs specifically designed to improve both the knowledge and attitudes non-agricultural teachers have concerning agriculture, land grant institutions can have a state-wide impact on populations typically not reached by traditional university efforts.

In response to the charge of providing a foundation of agricultural knowledge to teachers with no agricultural background, the Department of Agriculture Education and General Agriculture at Oregon State University joined forces with the Oregon Farm Bureau to develop and deliver an agricultural literacy program to assist teachers in integrating agriculture into their curriculum. The Summer Agriculture Institute (SAI) was established in 1988 to assist teachers in acquiring knowledge of agriculture and to aid teachers in developing lessons that integrate agriculture into their curriculum. This week long intensive training gave non-agricultural K-12 teachers an overview of agriculture

and its impact on society. Teachers received 60 hours of training and were required to complete a lesson plan which integrated agriculture into a lesson they currently taught.

Purpose

The purpose of this study was to determine if the participants in the Summer Agriculture Institute used agricultural information obtained at (SAI) in their curricula. The following research questions were addressed:

1. What were the demographic characteristics of the SAI participants?
2. Did K-12 teachers who participated in the agricultural literacy program use the agricultural information in their curricula?
3. What were teacher perceptions of content, structure, and usability of the agricultural literacy program presentations and materials?
4. What were teacher perceptions of student interest in implementing specific agricultural topics into the curriculum?
5. What barriers existed that prevented teachers from integrating agriculture into their curricula?

Procedures

The population used for this study included all K-12 educators who participated in the Oregon Farm Bureau/OSU Summer Agriculture Institute held at Oregon State University from 1988-1996. The accessible population was limited to K-12 teachers whose names were provided by the Oregon Farm Bureau and consisted of all available records of the participants who were still teaching. The list of names and addresses was cross-referenced with university records to determine if they maintained the same address and/or school since attending the agricultural literacy institute. For the individuals who had moved, the internet program *www.switchboard.com* was used to locate a useable mailing address. Individuals who had changed schools and moved were eliminated from the study.

A purposive sample of 81 participants who were teaching, and had obtainable addresses was identified from the population for inclusion in the study. Usable responses were received from 52 teachers for an overall response rate of 64.20 percent.

The data collection instrument was designed by Agricultural Education faculty at Oregon State University. The instrument was based upon the agricultural literacy concept areas identified by Frick et. al (1992), and the Institute objectives identified by Oregon State University and the Oregon Farm Bureau Federation. The instrument consisted of three sections including teacher perceptions of student interest in learning about agriculture, participants use of the agricultural literacy materials, and demographic information about the respondents.

The section regarding teacher perceptions included 36 statements for analysis based upon a 5 point Likert-type agree/disagree scale, with 5 representing strongly agree and 1 representing strongly disagree. The 36 statements were divided into six categories: a) sources of agricultural information, b) perceptions of student interest in learning about agriculture, c) barriers to implementing agriculture into existing lessons, d) implementing agriculture into the curriculum, e) summer agricultural literacy material, and f) the perceived need for teaching/learning about agriculture. The section involving use of SAI materials contained eleven statements requiring short answers, yes/no questions, and a selection of answers from a menu/list. Included in the instrument were 13 demographic questions.

Participants in the Summer Agriculture Institute ranged from pre-kindergarten teachers to advanced placement teachers in high schools, and had from three to thirty-five years of teaching experience. With this heterogeneous population, instrument reliability and validity were determined by a panel of experts, and a pilot test group. The instrument was further pilot tested by thirteen Summer Agriculture Institute participants from the 1996 institute, who were not included in the study.

The survey was mailed to the participants in the fall of 1996. A follow-up postcard was mailed to those individuals who had not responded in the first two weeks. Telephone calls were made to those individuals who did not respond to either of the previous contacts. Due to the time period covered by this research (8 years), no additional attempt was made to locate and contact the participants who had moved.

Findings

Demographic characteristics of the respondents are presented in Table 1 and 2. Over 55% of the respondents were elementary teachers, 21% were middle school/junior high school teachers and 17% were high school teachers. The level of education completed by the respondents varied from a Bachelor's degree to an educational specialist. Almost half of the respondents (44.2%) had earned a Bachelor's degree plus 30 credit hours, while 13.5% had earned a Master's degree. Over one-fourth of the respondents (26.9%) had earned a Master's degree with an additional 30 credit hours.

An analysis of the demographic data related to gender of the SAI participants revealed that 62% of the respondents were female and 37% of the respondents were male. Slightly more than half of the respondents (51.9%) indicated that they had relatives who lived on a farm, while 11.5% indicated taking an agricultural class either in high school or college. A total of 25% of the respondents indicated they were involved in 4-H or FFA while in high school.

Table 1.
Descriptive Information of Respondents in Summer Agriculture Institute from Usable Surveys (n=52)

Descriptive item	Item descriptors	Frequency	Percent
Grade level	Elementary	30	57.7
	Middle School/Jr. High	11	21.2
	Secondary	9	17.3
	Adult	1	1.9
	Missing	1	1.9
Degree attained	Bachelor	2	3.8
	Bachelor + 15	1	1.9
	Masters	7	13.5
	Bachelor + 30	23	44.2
	Masters + 15	3	5.8
	Masters + 30	14	26.9
	Ed Specialist	1	1.9
	Missing	1	1.9
Gender	Female	32	61.5
	Male	19	36.5
	Missing	1	1.9
Relatives living on farm	Yes	27	51.9
	No	24	46.2
	Missing	1	1.9
Agriculture courses in High School or College	Yes	6	11.5
	No	46	88.5
4-H or FFA background	Yes	13	25.0
	No	39	75.0
Population of nearest town	under 1,000	6	11.5
	1,000-2,500	8	15.4
	2,501-10,000	14	26.9
	10,001-25,000	8	15.4
	25,001-100,000	7	13.5
	over 100,000	9	17.3

Respondents were asked to identify the population of the town nearest their home. Choices were: a) under 1,000; b) 1,000-2,500; c) 2,501-10,000; d) 10,001-25,000; e) 25,001-100,000; f) over 100,000. Over one-fourth (26.9%) of the respondents reported that the population of the nearest town was between 2,501 and 10,000 with the remaining teachers evenly divided among towns of various sizes (Table 1).

The range of age of respondents was 24 to 64 with the mean age 46.67 (Table 2). The range of years of teaching experience for respondents was 3 to 35 years with the mean years of teaching experience being 18.92.

Table 2.
Selected Characteristics (n=52)

Descriptive Item	M	SD
Age	46.67	9.94
Years of Teaching Experience	18.92	7.55

The second objective was designed to determine if teachers who participated in the summer agricultural literacy program used the information gained in their curricula and, if so, to what extent was agricultural information integrated into existing lessons? Table 3 presents the frequency and percentages of daily lessons the respondents used each year.

Only five (9.6%) of the respondents indicated they had not used lessons that integrated agriculture into their curriculum.. Nearly 23 % of the respondents used agricultural information in 1-5 lessons each year. while 21 % of the respondents gave no definitive number of lessons used per year. Respondents in this category indicated difficulty in reporting data due to extensive thematic approaches for teaching students about food production, and that adopting agriculture as the framework for teaching all subjects made it impossible to accurately count the number of lessons used.

Table 3.
SAI Participants Integration of Agriculture Into Existing Course Work (n=52)

Number of Lessons/Year	Frequency	Percent
No lessons used	5	9.6
1-5	12	22.9
6-10	9	17.2
11-20	6	11.5
21-30	3	5.7
Greater than 30 lessons	7	13.3
No definitive number of lessons given	11	21.2

The third objective was designed to determine respondent's perceptions of the content, structure and usability of the materials and presentations offered at the Summer Agriculture Institute (SAI). The mean score for effectiveness of materials at SAI was 4.27.

When asked if the materials presented at SAI were appropriate for participant understanding, respondents agreed with a mean score of 4.42. A mean score of 4.33 represented teacher's perceptions that SAI provides a foundation in agricultural knowledge that is useful in implementing agricultural concepts into the curricula.

Teachers agreed there is a need to attend SAI to update themselves about agriculture (Table 4).

Table 4.
Mean (M) and Standard Deviation (SD) for Teacher Perceptions of Content, Structure, and Usability of Agriculture Information for the Curricula (n=52)

Description	M	SD
Material at SAI was effective	4.27	0.69
Material at SAI was useful for implementing agriculture into my lessons	4.02	0.73
Material at SAI was appropriate for my grade level and subject level	3.85	0.92
Material at SAI was at the appropriate level for my understanding	4.42	0.60
There is a need for teachers to attend SAI to update themselves about agriculture	4.49	0.70
SAI provides a foundation in agricultural knowledge that is useful in implementing agricultural concepts into my curricula	4.33	0.71

Table 5 illustrates the fourth objective of the study that determined teacher perceptions of implementing specific agricultural topics into the curricula. The strongest responses were for instruction about animals with a mean score of 4.48. A mean score of 3.10 represented teacher perceptions concerning student interest in learning about agricultural economics.

Table 5.
Teacher's Perceptions of Student Interest in Learning About Specific Agricultural Topics (n=52)

Agricultural Topic	M	SD
Soils	3.51	0.98-
Crops	3.91	0.66
Animals	4.48	0.61
Food Processing	3.65	1.02
Agricultural Mechanics/Technology	3.36	0.93
Agri-Business/Agricultural Economics	3.10	0.89
Agricultural Careers	3.58	0.87

The fifth objective was to determine barriers that prevent participants of the agricultural literacy program from integrating agriculture into their curricula. Table 6 presents the mean and standard deviation of eight barriers that respondents were asked to evaluate. The mean scores ranged from 1.84 to 3.71. Time to implement agriculture into the curricula received the highest mean score (M=3.71), and lack of follow-up from SAI coordinators received the lowest mean score in the category (M=1.84). This category contained items with the lowest mean scores.

The respondents had an opportunity to answer two open-ended questions. This allowed the researchers to gain insight into respondent's perceptions of SAI and to their motives for participating in an agricultural literacy program.

Table 6.
Mean (M) and Standard Deviation (SD) for Barriers to Implementing Agriculture Into Existing Lessons (n=52)

Barrier Description	M	SD
Time	3.71	1.19
Access to necessary supplies/materials/information	3.00	1.07
Lack of interest on teachers part	2.06	1.04
Lack of student interest	2.08	0.91
Lack of follow-up from SAI coordinators	1.84	0.75
Failure of previous lessons that implemented agriculture into my curricula	1.98	0.97
A change of teaching appointment	2.75	1.56
A change in the subject area taught since attending SAI	2.69	1.53

When asked to identify the element which created the most difficulty for integrating agricultural information into the curriculum, 18 different responses were generated. The most frequently stated factor was time. Fifteen respondents indicated that lack of preparation time created difficulty for getting agricultural information into the curriculum.

When asked to identify their purpose for participating in the SAI, the most frequently occurring response was the personal interest of the respondent. Fifteen different responses were given to this question. Gaining graduate credit and a desire to learn more about Oregon agriculture were tied for the second most frequently occurring response.

Conclusions

The following conclusions were based on the data collected from respondents participating in the Summer Agriculture Institute.

Participants in the Summer Agriculture Institute were experienced teachers. With an average teaching experience of 18.92 years and average age of 46.67 years, it could be concluded that participants in this agricultural literacy program were veteran teachers who were looking for ways to improve the quality and focus of their teaching.

Participants integrated agriculture into their existing lesson plans, with some utilizing the information gained in the agricultural literacy program to a high degree. Teacher perceptions of content, structure and usability of SAI presentations and materials was positive, with few exceptions. Participating teacher's perceptions of student interest

concerning the implementation of specific agricultural topics was most positive for animals, crops and food processing, while soils, agricultural mechanics and agricultural economics received the least positive scores.

Teachers felt the greatest barriers to implementing agriculture into existing lessons were the time necessary for curricula changes and access to necessary supplies/materials/information. Lack of follow-up from the SAI coordinators was not perceived as a barrier to implementing agriculture into the curricula. Since time and information were barriers to implementation and lack of follow-up was not a barrier to implementation one might conclude that local resource persons with dependable local information can help to alleviate the time constraint factor.

In general, teachers participating in the agricultural literacy project, called Summer Agriculture Institute, perceive it to be well planned and appropriate to their own level of understanding, while being adaptable to the grade level they teach. Additionally, respondents generally used the information gained at the institute to enhance their existing curricula, some to a large extent. Changes in curricula to include agricultural material was a primary goal of the institute, therefore it could be concluded that the goal of increasing agricultural content in the K-12 curricula for participants had been met.

Recommendations

1. The research indicated that most of the teachers who participated in the agricultural literacy program were veteran teachers. Further research should focus on specific motives teachers have for enrolling in this program. Why don't younger teachers and teachers with less teaching experience participate in the Summer Agriculture Institute?

2. The purpose of the Summer Agriculture Institute was to encourage K-12 teachers to integrate agriculture into their existing coursework. However, 32.5% of the respondents indicated they integrated agriculture into five or fewer lessons during the course of a school year. Further studies should focus on qualitative research methods to identify individual teachers who are not implementing agriculture to determine what improvements could be made to the program to enhance its usefulness to this population.

3. Respondents identified a lack of access to necessary supplies, materials, and information as the second most common barrier for not implementing agriculture into their curricula. Further study should focus on specific supplies and materials that could be included during the agricultural literacy program that would eliminate this barrier for teachers. Furthermore, follow up studies could identify the information these teachers demand in order to increase the chances they will utilize the knowledge gained at the institute and/or determine the importance of local contacts for implementation and continued growth in agricultural knowledge and skill.

4. Finally, information gathered in the open ended question portion of this research indicated that different teachers found many of the same elements of the institute to be very popular. Further research should focus on the teacher perceptions of each section of

the institute, and the correlation between teacher attitude toward the components of the agricultural literacy program and their ability and/or desire to integrate that specific section into their curricula.

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